D. FOLSON

American Potato Journal

Published Monthly by

The Potato Association of America

"Entered as second-class matter May 31, 1924, at the post office at Washington, D. C., under the Act of March 3, 1879."

SUBSCRIPTION PRICE $1.00 PER YEAR

VOL. IV. NO. 8 AUGUST, 1927

IDENTIFYING SPINDLE-TUBER IN THE FIELD

H. O. Werner,

Professor of Horticulture, Univ. of Nebraska

The spindle-tuber disease is probably one of the most widespread of all diseases attacking potatoes in the United States. Our experience during the last 9 years, when plants afflicted with this disease, have been under observation, lead us to believe that the disease occurs in all potato regions, more so in some than in others. Growers in some regions may not have learned to identify the disease under their conditions. Environment plays a very great part in altering the symptoms. The writer aims to describe the symptoms as they have been observed under central western plains conditions where the climate ranges in some portions from a typical corn belt climate to a relatively cool mountain climate in other regions. It is possible that the symptoms described may represent different stages of severity of the same disease or they may represent two or more distinct diseases which are not yet separately identified.

The plants of tubers infected with the disease emerge later than those from normal tubers,—quite commonly a week later and not infrequently a month or more later. The plants have an erect stiff appearance with the leaves branching out at a sharp angle. The leaves are stiff, being folded upward along the midrib, and frequently the margin of the leaf is distinctly ruffled or rolling. The main petiole of the compound leaf is straight and does not droop wth a graceful curve as does that of a normal leaf. The flowers are produced prematurely and generally more profusely than in normal plants. They are also more conspicuous.

The symptoms described are most pronounced at high temperatures, on heavy soils and late in the season. It is frequently difficult to detect the disease in the early part of the season or in regions with a prevailing low temperature. Under greenhouse conditions the symptoms are entirely different.

Spindle-tuber plants are shorter lived than normal plants tho in the field they may appear to be longer lived as they sometimes remain green for a longer period. This is due to their much later emergence previously referred to. Spindle-tuber also appears to increase the susceptibility of the leaves to tip-burn.

Sometimes confusion may occur in distinguishing from leaf roll symptoms. In some respects there is similarity, but on the whole the spindle-tuber symptoms are very distinctive. There is no excessive starch accumulation in spindle-tuber leaves, nor are the leaves pigmented.

Frequently diagnosis on the basis of "top" symptoms may be confirmed by inspecting the young, newly formed tubers. Elongated shape and numerous shallow eyes are distinctive tuber symptoms. In red colored varieties the color is a distinctly lighter color. However, due to the great variation in tuber symptoms as a result of environmental conditions it is desirable to learn the distinctive plant symptoms. Frequently infected plants showing symptoms will produce tubers that do not show symptoms distinctly, but which next year produce seriously diseased plants. This is especially likely to be the case when the crop is planted late or when conditions are favorable for tuber development during the later life of the plant. For this reason growers in cool climate regions will probably experience more difficulty in detecting these plants in the field than will the growers located in the warmer areas.

NET NECROSIS OF THE POTATO TUBER

Alfred H. Gilbert

Most potato growers and students of potato diseases are more or less familiar with the occurrence of tuber discolorations, and of brown spots and areas in the flesh of the tuber which seriously affect its use both for consumption and for seed.

There are several types of killing or necrosis of portions of the tuber which may be distinguished with some degree of confidence. The causal factors also are known in some instances while in others further investigation is necessary to explain the origin of these conditions. Of certain necrotic conditions about which there is evidence as to cause, the following may be recalled: Stem end browning, due to Fusarium or Verticillium or other soil organism; internal brown spot, which by some is believed to be associated with certain soil conditions; and frost necrosis, due to exposure to freezing temperatures.

Net necrosis or phloem necrosis is distinguished from other necrotic conditions in that it affects primarily the phloem strands of the vascular system of the tuber, is progressive in its development from the base to the apex of the tuber, and is associated with leafroll, one of the degeneration diseases of the potato. Necrosis

of this type might readily be confused with the "net" types of frost necrosis where the browning is chiefly confined to the vascular tissue, including the inner and outer phloem strands. In such cases microscopic examination would be necessary in order to distinguish with certainty between these two tuber troubles.

It has previously been shown by several investigators that net necrosis of the tuber is associated with leafroll. The correlation as the writer has studied it in the field and experimental plot is that tubers exhibiting this type of necrosis produce in every case leafroll plants. A fact that has been somewhat confusing in connection with the association of net necrosis with leafroll is that while leafroll symptoms are persistent in the progeny plants, the tuber necrosis is not persistent, but seems to be a first season symptom following initial leafroll infection. Further experiments are now under way for the purpose of furnishing more evidence as to this hypothesis, and microscopic study of the necrotic tuber tissues is also giving further information as to the particular cells affected in net necrosis. The results show that net necrosis of the tuber is properly a "phloem necrosis" since it is the phloem strands of the vascular system that are affected.

Quanjer of Holland about 1910-1913 gave the name phloem necrosis to the leafroll disease because of his observation that the phloem of the stems of diseased plants was consistently and characteristically affected. Since in the case of the tuber net necrosis, it is the phloem that is killed, a certain relationship is thereby indicated between leafroll and phloem necrosis of the tuber.

The cause of net necrosis is not known, but the disease is presumably a specialized effect of the leafroll virus—if we may assume that leafroll is due to a virus. Since the phloem strands are the active conducting channels of the tuber, any substance toxic to the potato which may have been introduced by aphids or otherwise, would necessarily be distributed along these channels. Such a hypothesis is in accord with the present ideas as to the nature of leafroll.

In this connection it is of interest to record the fact that a German investigator (Schweizer)[1] in a recent paper claims to have brought about the disappearance of leafroll symptoms in the foliage of potted potato plants and the permanent resumption of normal foliage condition by injecting into the tissues of the stem solutions of egg albumen and pepsin. These were introduced by a capillary glass tube in the axil of a lower leaf. The rolling and stiffness of the leaves of the diseased plant disappeared after the treatment in the course of eleven days, and furthermore it is stated that while phloem necrosis is to be observed in the parts of the plant developed prior to the treatment, in the new growth subsequent to the treatment no such necrosis is present.

---

[1] **Schweizer, G. Zur Blattrollkrankheit der Kartoffelpflanze. Ber. der d. Bot. Gesell. 44: 551. 1926.**

These results have not so far been verified by others and may perhaps be considered as merely tentative. They are, however, of much interest as indicating another method of approach to the study of the leafroll problem and further evidence as to the rather remarkable and spectacular results reported is much to be desired.

A FARM CELLAR FOR SEED POTATOES

C. L. Fitch, Ames, Iowa.

The illustration below shows a seed potato cellar on the farm of Kalem Brothers south of Moorhead, Minnesota, in the Red River Valley. Even in those regions too cold for winter deliveries so that the main crop of potatoes has to be hauled to the trackside warehouses at harvest time, there is a need for a cellar for the storage of the seed kept for planting the home crop.

This is a very good one. It is set high to get above a high ground water level. In a deeply drained country, frost could be kept out in the winter and low temperatures could be held better in the spring were this cellar set four feet farther into the ground. The above cellar requires banking to the eaves in the winter. A deep set cellar would require a longer vestibule, and the passage of a larger cellar should be made wide enough to back wagons down into it for pulling the loads out with teams. It takes stout backs and stout hearts even to carry out the 2000 bushels that this

cellar holds. Three or four feet of earth instead of the framed roof and covered with strawy manure in the spring, might be an improvement, because of the low temperature such frozen earth would hold. Some moisture is preferable to too much drying or warmth but is hard on roof timbers. Perhaps concrete arches covering about 1-3 the ceiling could be devised to carry a dirt roof.

I do not believe in floors of any kind for ordinary seed or tablestock potato cellars. The earth is better, nor do I believe in the ordinary bins. Great crates built without bottom, with frames inside, and not over 8 feet wide for northern states and not over 6 feet wide in warmer regions, are the only thing. They can be up to 12 feet deep, and any length. Storage of seed or tablestock in great bulk is bad management. It causes heating, flyrot and losses.

The roof hoppers, padded, and canvasses inside, with dirt screen from wagon to hopper are the best known equipment for unloading quickly cheaply and gently.

POTATO CONFERENCES AND TOURS

POTATO FIELD DAY AT OHIO EXPERIMENT STATION

As a part of Horticultural Field Day at the Ohio Experiment Station, Wooster, August 19, a special opportunity will be given to inspect the potato experiments. The work to be seen includes: A fertilizer experiment now in its 35th year; dusting and spraying for leaf-hooper control, featuring home-mixed dusts; a study of the factors influencing the number of sprouts developing from a seed-piece; storage; time of planting; mulching, and spacing experiments.

Wooster is on a mainline of the Pennsylvania R. R., on U. S. Highway Route 30, and is reached from all directions by paved highways.

The comparative tests of certified seed are located at the Strongsville substation, near Cleveland. Visitors are always welcome, but no special field day is planned for this year at the substation. **—John Bushnell.**

INTERNATIONAL HORTICULTURAL CONGRESS

The VIII International Horticultural Congress will be held in Vienna, September 19-25, 1927, according to the announcement and program sent to the editor recently. The program is very interesting. The arrangement of the International Horticultural Congress 1927 has been entrusted to the Horticultural Society of Austria in Vienna, which is celebrating the centenary of its foundation, by the Secretary's Office of the International Committee for the arrangement of International Horticultural Congresses (Secretary: Pro. Dr. M. J. Sirks, Wageningen, Holland) after the governments of the states concerned had been consulted.

AMERICAN POTATO JOURNAL

PUBLISHED BY

THE POTATO ASSOCIATION OF AMERICA

WALTER M. PEACOCK. EDITOR & BUS. MGR.

108 BALTIMORE AVE., TAKOMA PARK, D.C.

CONTENTS

	Page
Identifying spindle-tuber in the field, H. O. Werner	89-90
Net Necrosis of the potato tuber, Alfred H. Gilbert	90-92
A farm cellar for seed potatoes, C. L. Fitch	92-93
Potato Conferences and Tours:—Potato field day at Ohio Experiment Station; International Horticultural Congress	93
Editorial Notes:—New members; Proceedings of the last meeting; Review of recent research literature	94-95
Crop and Market News:—Heavy production predicted, Prices decline; Connecticut; New Jersey; New York; Rigid Potato certification standards, P. E. I.; Virginia	95-100
Review of Recent Literature:—	
The relation of weather to the date of planting potatoes in northern Ohio, John Bushnell	100

NEW MEMBERS

More than sixty new members have been added to the membership list since publishing the July issue. This is very gratifying. There are now 705 active members and 1121 associate members. Some states have increased their membership from 200 to 300 per cent since the beginning of the year. Our goal is 2500 paid up members before the end of the year. Now is the time when members are coming in contact with growers and others who are not members of our association. Why not help these by getting them to become members of the Potato Association of America? Simply send in their name, mailing address and a check, Post Office Money Order or cash to your state membership chairman, or to the editor. Make all checks and P. O. M. Orders payable to the Potato Association of America.

PROCEEDINGS OF THE LAST MEETING

The Proceedings of the Thirteenth Annual Meeting of the Potato Association of America held at the University of Pennsylvania, Philadelphia, Pa., December 28-30, 1926, has been sent to the active members who were members before the beginning of this year. Those who joined this year will receive a copy of the Proceedings of the next Annual Meeting which will be held in Nash-

ville, Tenn. next December. The Proceedings of the last meeting contains 29 papers and 6 reports. It is the best Proceedings published by the Association to date. Since every report is better than the previous one the chances are that the next one will crown them all. Hint—Become an active member now. Associate membership dues, $1.00 per year and active membership dues $2.00. If you are a paid-up associate member you can become an active member by sending in $1.00.

REVIEW OF RECENT RESEARCH LITERATURE

Every reader of the American Potato Journal is interested in learning more about the potato. The editor is making another appeal to authors of potato research literature to send in an abstract of it as soon as permissible. Abstracts of research literature published in other than the English language are very highly appreciated.

CROP AND MARKET NEWS

HEAVY PRODUCTION PREDICTED; PRICES DECLINE

(Contribution from the Fruit and Vegetable Division, Bureau of Agricultural Economics, U. S. Department of Agriculture)

What will the harvest be? A great deal depends on the kind of seed planted. Production of certified seed potatoes in the United States has shown an encouraging increase during recent years, and growers are coming more and more to use the certified product.

In round numbers, officials reports of certified seed show about 1,500,000 bushels grown in 1921; more than 2,000,000 in 1922; over 4,000,000 in 1923, and approximately 8,000,000 bushels in 1924, the peak year for this industry. The sharp increase between 1923 and 1924 was chiefly in Maine, where the average yield of potatoes per acre usually exceeds that of any other state. Since 1924, Maine has not even half equaled the 5,000,000-bushel certified crop of seed stock grown there in 1924, though still credited with some 2,000,000 bus. or about half the United States total. The combined 1925 outturn in all States was more than 4,000,000 bushels, and last year about 5,000,000 bushels of certified seed were produced. Next important States, in order after Maine, were Minnesota, Idaho and Michigan. These four together grew about 75 per cent of the 1926 certified seed crop.

Prices last season ranged anywhere from $1.50 to $3.00 per bushel, according to demand, variety and time of delivery, but most of the returns to growers averaged above $2.00. Some sales of Oregon seed were made at $3.75. In certain sections, the premium obtained

on certified seed was 50 cents, compared with the price of table stock. Production of certified Cobblers exceeded that of any other variety in 1926, whereas until 1924 Green Mountains held first place. Last year, about 2,000,000 bushels of Cobbler seed were certified, as against 800,000 Green Mountains, Maine of course leading for both varieties. Spaulding Rose ranked third in 1926; Netted Gem fourth, and Triumph fifth.

Heavy Crops This Year

Many of the northern and western States expect to harvest heavy crops of potatoes. Some of the mid-season sections also have established new records. Virginia has more than 17,000,000 bushels, compared with 11,500,000 last year and a five-year average of less than 15,000,000. Maryland probably will harvest 5,000,000 bushels. The Eastern Shore district of these States has set a new high figure for shipments, approximately 22,000 cars having been forwarded this season.

There is a marked tendency toward increased production from the Carolinas northward to Maine, as well as in the far West. Maine expects the remarkable total of 40,000,000 bushels of potatoes, though in 1924 about 45,000,000 were produced. Idaho has made rapid strides and may have twice as many potatoes as were harvested there in 1924. Production in the Pacific Northwest this season may balance the heavy crop anticipated in Maine. The North Central region is always a heavy producer.

During July, crop prospects improved in all sections of the country and in nearly all the important states. Present condition of the crop is quite uniformly good, and average yield per acre may reach the high total of 117.5 bushels, or 4.5 bushels more than in 1926. Total estimated production of 411,000,000 bushels is approaching the huge crop of 1924, but it must be remembered that population also has increased in the past three years. The present estimate is about 18,000,000 bushels higher than the July forecast, 55,000,000 greater than last season's crop, and 17,000,000 bushels above the five-year average production.

The relative estimated production in 35 late-shipping States is shown in the following table:

Group	1927 forecast	1926 crop	5-year average
	(bushels)	(bushels)	(bushels)
19 surplus-producing States	292,425,000	251,788,000	279,957,000
16 deficient States	86,643,000	74,872,000	86,838,000
Total, 35 late States	379,068,000	326,660,000	366,795,000

Prices Slump and Then Recover

Following the peak movement from Eastern Shore of Virginia and Maryland and the liberal receipts in terminal markets, a sharp break in prices occurred during late July. Almost immediately,

total shipments dropped to 3,300 cars for the opening week of August,—the lowest record since June 1,—and markets regained a good part of their previous loss. Arrivals that week in New York, Philadelphia and Baltimore were less than half as heavy as the preceding week, and midwestern market supplies also were reduced. Some western buyers were purchasing in the East. The Eastern Shore of Maryland had already passed its peak movement; Missouri and Long Island were becoming increasingly active, but New Jersey led all other States with a total of 780 cars for the week. New Jersey's output would have been heavier, except that rains prevented digging for a short period. Many of the late-shipping States were rapidly augmenting the market supply, though the northern season in general is somewhat delayed. City jobbing sales of eastern Cobblers on August 6 ranged mostly $3.00-$4.00 per barrel and $2.00-$2.50 per 100 pounds sacked. West Virginia arrivals in Pittsburgh topped the sacked potato market. Midwestern stock showed a wide range of $1.75-$2.85, but the Chicago carlot market had again declined to $1.65-$1.80. F. o. b. sales on the Eastern Shore closed at $3.00-$3.25 per barrel, with sacked Jersey Cobblers bringing $1.85 per 100 pounds at shipping point and Kaw Valley stock ranging $1.65-$1.75. Eastern prices generally were lower than last year.

Connecticut.—During the past two weeks Connecticut potato growers have had to contend with a severe infestation of aphids, which in some instances were numreous enough to actually kill the vines. However, most of the larger growers have been able to subdue the pest before this disastrous effect had resulted. Both dry and liquid forms of nicotine have been used with good results. With either method two applications, at short intervals, have practically eliminated the danger from the aphids. When a spray is used it is essential that a high pressure—250-300 pounds—be maintained in order that a mist will envelop the vines and bring the nicotine sulphate into actual contact with the insects, which are usually found on the under side of the leaves. Aprons, made of light cloth, are used with the dusting outfits for the purpose of holding the dust around the vines.

It is still an open question as to which of the above methods is the better, but if the sprayer can approach the results with the duster in killing aphids, the former has a distinct advantage, in that Bordeaux can be applied at the same time. The consensus of opinion in this region favors liquid Bordeaux for the prevention of late blight and as a repellent against flea beetles and leaf hoppers. Another advantage claimed for liquid nicotine is its lower cost per acre for material. The month of July has also furnished good weather for the development and spread of late bilght.

Frequent showers and continuous high humidity have obtained for the past three weeks. The growers, who do a good job of spraying with Bordeaux will benefit from such moisture conditions, but the others will undoubtedly suffer some loss.

In spite of the various troubles which potatoes are heir to, the 1927 Connecticut crop promises to be above normal, partly due to an increased acreage and partly to more favorable than unfavorable growing conditions.

Connecticut grown Cobblers are now appearing in quantity. The market in potatoes is rather weak with prices at $3.50 to $4.00 per barrel.—**B. A. Brown, July 27.**

New Jersey.—The South Jersey potato growers are getting their seed planted and the soil seems to be in excellent condition and most of the seed came out of storage in good shape so that the prospects for a high yielding crop are above the average. **—Wm. H. Martin, Aug. 1.**

New Jersey.—The low prices have resulted in a very light movement of potatoes the last week and the indications are that the movement from New Jersey will not be heavy before the middle of August. The crop is good, a number of growers digging over 100 sacks of U. S. Grade No. 1 per acre and the quality is better than normal. In cases where the growers sprayed, the vines were still green August 1, due largely to the protection against the leaf hoppers. The New Jersey growers have found that thorough spraying with Bordeaux mixture, without nicotine sulphate, will give almost 100 per cent control of this insect.

The late crop is now being planted and most of the seed has been disinfected by the dip treatment, using the organic mercury compounds. In most every instance the seed was treated before, rather than after cutting. A large number of growers are planting seed plots by the tuber unit method this year and a number are using the modified Iron Age two-man planter to plant the units. By stopping up two of the openings in the feed wheel and removing the automatic feed, a very satisfactory tuber unit machine has been developed. The potatoes are cut and placed in trays, a number of which may be carried on the machine.

This year a number of growers will tuber unit New Jersey red skins so that next year there should be available a fair supply of high grade seed of this variety. The red skin has done very well in Maryland and promises to replace the McCormick. In South Jersey, it is grown by a large number of growers as a cash crop and finds a ready market in Atlantic City and Philadelphia. **—August 7.**

New York.—Late blight has been already reported in six fields in different parts of the state, and is probably present in many other fields. The first report was July 30th, which is an early date for the first observation of blight in up-state New York.—**Karl H. Fernow, Aug. 6.**

RIGID POTATO CERTIFICATION STANDARDS

H. T. Güssow, Dominion Botanist

P. E. I.—In view of the several complaints received from Southern growers during the Spring of this year who used Certified Seed Potatoes grown in Prince Edward Island, the Department of Agriculture has obtained and planted a series of twenty-three different samples of Certified Potatoes selected at random from the storages in Virginia and representing the exact type planted in the South about which complaints were made. These potatoes have been planted in the usual manner at Charlottetown, P. E. I., and have been carefully examined by the Dominion Botanist and his inspection staff with the result that the germination of these tubers has been determined throughout to be not less than 98.8 per cent. Moreover the stand obtained is perfect from the point of disease freedom.

In view, however, of the complaints made, the Inspection Service is determined in the interest of the future of the Certified Seed Potato Industry of the Island to certify no field of potatoes on the Island not in every respect suitable to maintain the reputation of the Service, the growers and the industry as a whole. Thus the inspectors are hereby instructed to pass no field for certification unless showing not less than 90 per cent of a stand that will qualify according to the standards set for certification. That is to say fields with misses amounting to more than 10 per cent will be disqualified as well as fields showing less than 10 per cent misses providing the stand is uneven and showing weak hills of any kind.

It is hoped that every conscientious grower of the Island will support this attitude and continue thus to aid in the further advancement of an industry which has proved its great value to the entire province. It must be remembered that we can only hope to retain our present markets and make progress in new ones by the supply of Seed Potatoes that cannot be surpassed anywhere else.

Virginia.—One of the most strenuous potato seasons in the history of the Eastern Shore of Virginia is rapidly drawing to a close. By the middle of August the movement from that section will practically cease and those in charge of distributing this bumper crop will breathe a sigh of relief. About 17,000 cars of potatoes have already been shipped from the Eastern Shore of Virginia and probably 1500 carloads remain to be moved in the near future. The shipments from the Norfolk section has been about 4200 carloads. Potato prices were quite satisfactory during the early part of the season and the growers in the lower part of the peninsula and in the Norfolk section obtained a reasonable profit on their potato crop. During the past few weeks the market has been much lower, $2.30

to 2.90 per barrel at Eastern Shore points and the movement has been rather slow. Because of the lower prices and the slow movement the growers in Accomac county have realized very little profit. Much of the crop is still stored in commercial and farm storage houses or left in barrels in the field. The cost of sorting and refilling barrels which have stood in the fields for several weeks has greatly reduced the returns. The yields throughout the Virginia section have been exceptionally high. Crops of 100 to 120 barrels per acre were quite common and yields as high as 170 barrels per acre have been reported. Much credit must be given to the cooperation of the Eastern Shore selling agencies in maintaining the price level at a fair figure for so long a time under such strenuous conditions. The main trouble was **"Too Many Potatoes."** Six thousand cars less would have netted more money to the growers.—**H. H. Zimmerly, August 1.**

REVIEW OF RECENT LITERATURE

BUSHNELL, JOHN.—**The relation of weather to the date of planting potatoes in northern Ohio.**—*Ohio Sta. Bul. 399. (1926)*

After a review of the literature on variety distribution and time of planting, potato production is divided into three zones: (1) The south, where potatoes are grown largely as a spring or fall crop; (2) An intermediate zone, where Rural varieties predominate and the season is longer than these require to mature; (3) The north, where the crop requires the entire season. Southern Ohio is in the southern zone, northern Ohio in the intermediate zone. The dividing line lies close to the isotherm of 73 degrees F. mean July temperature.

In regard to factors affecting the yields from different planting dates in the intermediate zone, it is maintained that temperature is the important consideration and that the sensitive period in the plants life cycle is not confined to the time of tuber setting, but extends thruout the period of tuber growth.

The date of planting giving the highest yield is therefore the one which gives the longest period of cool weather for tuber development. Plantings of Rural Russets the latter half of May, if properly sprayed, survive thru the fall until frost, and have given the highest yields.

If hoppers are not controlled, the plants are killed prematurely, therefore it is suggested that unsprayed crops should be planted later.

Early April planting of Rurals is also advised, particularly for the southern edge of the intermediate zone.—**The author.**